

## New Primulaceae

BY

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AND

GEORGE FORREST.

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***Primula Agleniana*, Balf. f. et Forrest var. *alba*, Forrest.**

A typo floribus albis variat; in specie nobili fortasse mentione digna.

"S.E. Tibet:—Salween-Kiuchiang divide, Tsarong. Lat.  $28^{\circ} 24'$  N. Long.  $98^{\circ} 24'$  E. Alt. 15,000 ft. Plant of 12–16 inches. Flowers fragrant, white, faintly flushed rose exterior. Moist alpine pasture on the margins of cane brakes. July 1921." G. Forrest. No. 20081.

It is possibly worth recording that the typical *P. Agleniana* was found in July 1905 on the Mekong-Salween divide, at an altitude of 11–13,000 ft., Lat.  $27^{\circ} 28'$  N., under Forrest No. 479, an incomplete specimen which remained for long unidentified. See Notes R.B.G., Edin. VI. (1912) 37.

***Primula aromatica*, W. W. Sm. et Forrest.**

Species valde distincta cuius affinitas cum sectione Malvaceae esse videtur; foliis in vivo carnosulis aromaticis, in sicco deliciatissimis, scapo floribusque gracillimis ab affinibus facile cognoscitur.

Planta 7–12 cm. alta calcicola caespitosa glebam parvam formans radicibus permultis gracilibus. Folia pauca petiolo 3–5.5 cm. longo flexuoso pilis longis albidis densius ornato praedita; lamina plerumque 2.5–3.5 cm. longa atque fere aequa lata, late ovata, ad quartam partem 7–9-lobata, lobis rotundatis et nunc trilobulatis, apice rotundata, basi breviter cordata vel subtruncata, textura in sicco tenuissima, sparsim pilosula vel utrinque fere glabra, margine pilis glanduli-capitatis minutis ciliolata. Scapus ad 12 cm. altus folia plerumque bene superans pilis ut petioli indutus inflorescentiam 1–5-floram spiciformem gerens; intervalla inter flores 5–10 mm.; bracteae 5–7 mm. longae lineares vel e basi petioliformi lanceolatae vel anguste oblan-  
ceolatae, ad basim pedicelli positae vel nunc sub calyce subadnatae pilis glanduliferis minutis ciliolatae; pedicelli brevissimi vix 1 mm. superantes. Calyx circ. 6 mm. longus foliaceus fere ad imum in lobos lanceolatos acutos fissus glanduloso-pilosulus. Corollae tenuissimae roseae circ. 1.5 cm. longae tubus cylind-

dricus 1 cm. longus flavidus pilis minutis conspersus, lobi anguste obovati emarginati glabri. Stamina in flore longistylo ad quadrantem tubi corollini inferiorem inserta antheris vix 1 mm. superantibus, in flore brevistylo paulo infra os posita. Ovarium subglobosum; stylus glaber in flore longistylo ad os pertinens, in flore brevistylo ad quadrantem tubi attingens; stigma capitatum. Fructus globosus apice valvis 5 dehiscentes seminibus numerosis angulatis circ. 0.5 mm. longis.

"West China:—Goo-du Shan, Yunnan. Lat.  $28^{\circ} 16'$  N. Long.  $100^{\circ} 12'$  E. Alt. 9-10,000 ft. Plant of 3-5 inches. Flowers rose, tube green. Foliage fragrant. Moist situations on limy cliffs and slopes. July 1921." G. Forrest. No. 20568.

A most remarkable Primula for tenuity of foliage and flower—in the dried state at least—for both have the fragility associated with dried flowers of *Impatiens*. It is placed with some doubt in the series Malvaceae, but the alternative seems to be a new section.

**Primula atrotubata**, W. W. Sm. et Forrest.

Species szechuanica ex affinitate *P. malvaceae*, Franch. a qua habitu minore, floribus saturate roseis, corollae tubo atropurpureo lineato, oculo kermesino inter alia divergit.

Planta 10-20 cm. alta. Folia petiolo laminam subaequante vel saepe multo breviore pilis albidis patentibus longis bene induito munita; lamina 3-7 cm. longa, 2.5-5 cm. lata, subovalis vel late ovata, apice rotundata, basi breviter cordata, margine grosse crenata atque ciliolata, textura in sicco tenuis, supra pilis conspersa, subtus ad costam nervosque dense pubescens, ceterum hic illic glabrescens. Scapus ad 20 cm. altus dense pubescens umbellas 2-3 superpositas in modum *P. malvaceae* gerens; bracteae 6-8 mm. longae linear-lanceolatae foliaceae pubescentes ut pedicelli 8-13 mm. longi. Calyx 1 cm. saepe superans post anthesim accrescens, late cupularis pubescens atque glandulosus in lobos late ovatos acutos ad duas partes fissus. Corollae saturate roseae tubus anguste cylindricus calycem aequans vel nunc paulo superans infra medium paululo constrictus atropurpureus lineatus extra sparsim pubescens, annulus conspicuus, lobi 6-7 mm. longi obovati alte bilobulati. Stamina in flore longistylo ad tubi corollini partem constrictam inserta. Ovarium globosum parvum; stylus in flore longistylo vix ad os pertinens; stigma capitatum. Fructus haud maturus calycis tubo bene inclusus.

"West China:—Mountains east of Yung-ning, S.W. Szechuan. Lat.  $27^{\circ} 50'$  N. Long.  $100^{\circ} 56'$  E. Alt. 10-11,000 ft. Plant of 4-8 inches. Flowers deep rose with crimson eye. Dry stony meadows. July 1921." G. Forrest. No. 20508.

"Muli, S.W. Szechwan. Alt. 6-7000 ft. Flowers bright rose-pink, striped outside. In the bed of the Litang river under shrubs and in thick growth, well shaded. Calcareous soil. A species in which the calyx is larger than the flower! A very late flowering species. Though more advanced on 16.7.21 it was clearly not yet in full bloom. When properly out, it is a beautiful plant, the rich rose-pink and dark eye showing up against the foliage in striking manner. July 1921." F. K. Ward. No. 4351.

*P. atrotubata* is closely akin to *P. malvacea*, Franch. but we are unable to match it with any of the numerous collections of that species from Yunnan. When in flower the dark-coloured corolla-tube with longitudinal lines and the crimson eye serve for discrimination.

#### **Primula aurantiaca**, W. W. Sm. et Forrest.

Species e grege Candelabra, habitu *P. burmanicae*, Balf. f. et Ward; a speciebus ejus sectionis flavidifloris calycis forma lobisque facile distinguitur; scapus fructiferus saepe decumbens apice gemmas foliosas proferit.

Planta ad 25 cm. alta. Folia sat numerosa rosulata petiolata, majora 12-16 cm. longa, 2.5-3.5 cm. lata, oblanceolata apice plus minusve rotundata margine eroso-denticulata, deorsum in petiolum lamina duplo-breviore alatum vaginante sensim attenuata, in sicco tenuiter papyracea, glabra, utrinque nervis in sicco conspicuis, costa media lata; superficies infra pallidior obscure pulverulenta. Scapi 1-2 satis robusti ad 25 cm. alti glabri umbellas plerumque 6-12-floras 2-6-superpositas intervallis 2-3 cm. longis gerentes; bracteae 9-11 mm. longae lineares ad basim pulverulentae; pedicelli 6-8 mm. longi sub fructu erecti; scapi fructiferi nunc decumbentes gemmas bene foliosas radicantes proferentes. Flores saturate rubro-aurantiaci. Calyx anguste campanulatus circ. 7 mm. longus extra subatratus intus viridis in lobos 5 anguste oblongos 4 mm. longos apice acutos vel nunc obtuse 2-3-lobulatos divisus. Corollae tubus circ. 12 mm. longus angustus annulatus, lobi 4 mm. longi anguste obovati vel suboblongi emarginati. Antherae in flore brevistyllo ad os corollae insertae. Ovarium globosum; stylus brevis calyce brevior, longus ad os corollae pertinens; stigma magnum capitatum. Capsula globosa ad 5 mm. diametro e tubo calycis ampliati paulo exserta seminibus 1 mm. diametro angulatis nigris papillatis.

"West China:—Chien Chuan—Mekong divide, Yunnan. Lat.  $26^{\circ} 30'$  N. Long.  $99^{\circ} 40'$  E. Alt. 11,000 ft. Plant of 7-10 inches. Flowers deep ruddy-orange. Moist alpine pasture

by streams. July 1922." G. Forrest. Nos. 21497, 22318 (Sept. 1922 in fruit).

The following numbers are conspecific, representing a form with greener calyx and paler corolla but otherwise agreeing with the typical plant even in the presence of occasional rooting buds at apex of the scape:—

Same locality. Alt. 11-12,000 ft. Plant of 8-12 inches. July 1922. G. Forrest. Nos. 21501, 22287 (Sept. 1922 in fruit).

**Primula brachystoma**, W. W. Sm.

Species ex affinitate *P. serratifoliae*, Franch. a qua foliorum forma atque denticulatione, calycis lobis brevibus, corollae tubo aequo et anguste cylindrico, lobis corollinis brevibus subquadris inter alia divergit.

Planta ad 20 cm. alta efarinosa epilosa. Folia petiolo vix discreto alato brevi suffulta; lamina 6-12 cm. longa, 1.5-2 cm. lata, oblanceolata vel sublanceolata, apice angustata atque breviter apiculata, basi sensim in petiolum decurrentes, margine denticulis brevissimis induratis praedita, in sicco tenuiter papyracea, glabra. Scapus ad 20 cm. longus gracilis glaber umbellam simplicem 2-6-floram gerens; bracteae ad 6 mm. longae basi latiusculae linearis-lanceolatae acutae glabrae; pedicelli 5-10 mm. longi; flores plus minusve cernui. Calyx circ. 5 mm. longus anguste campanulatus glaber submembranaceus pallido-viridis lobis vix 1 mm. superantibus triangularibus indurato-apiculatis. Corollae flavae annulo valde distincto tubus aequo cylindricus circ. 8 mm. longus glaber, lobi circ. 4 mm. longi subquadrati breviter emarginati. Stamina ad medium tubum inserta. Stylus (? bene evolutus) vix calycem aequans; stigma magnum capitatum; ovarium globosum. Fructus deest.

"Upper Burma:—Shing Hong region, Burmo-Chinese frontier at 9000 ft. A few plants only as yet seen; in the wet precipitous grassy margin of a cascade in the lower alpine region but probably seeded down from a higher station. The flower is going to be golden yellow. June 1920." R. Farrer. No. 1635.

The affinity of the species seems to be with *P. serratifolia*, Franch. Although showing no sign of superposed umbels in the present state, for the specimens are of young plants, it is referred to the Candelabra series.

**Primula caldaria**, W. W. Sm. et Forrest.

Species ex affinitate *P. Knuthianae*, Pax, specie shensiensi a qua habitu nunc triplo elatiore, bracteis basi gibbosis, calycis

brevioris lobis angustioribus, corollae albae tubo e calyce magis exerto divergit.

Planta 15–50 cm. alta gracilis albo-farinosa glabra. Folia varia nunc maxima ad 25 cm. longa 3.5 cm. lata; lamina a petiolo vix discreta ad 10 cm. longa oblanceolata apice rotundata basi in petiolum aequilongum vel nunc longiore alatum ad insertionem dilatatum sensim angustata, margine obtuse denticulata, in sicco membranacea, subtus dense albo-farinosa; nunc in speciminibus parvis folia multo minora saepe circ. 3.5 cm. longa, 6 mm. lata apice magis acutata, petiolo laminam haud aequante. Scapus ad 50 cm. altus flexuosus gracilis glaber sub inflorescentiam albo-farinosus umbellam 20–30-floram gerens; bractae 6–8 mm. longae a basi lata lanceolatae acuminatae basi gibbosae; pedicelli 8–16 mm. longi erecti graciles nunc albo-farinosi. Calyx ad 5 mm. longus campanulatus albo-farinosus in lobos anguste lanceolatos acutos fere ad medium fissus. Corollae albae tubus ad 7 mm. longus cylindricus supra dilatatus annulatus, lobi circ. 3.5 mm. longi et lati obcordati emarginati. Stamina in flore brevistyllo ad basim partis corollinae dilatatae inserta antheris 2 mm. longis ad corollae os pertinentibus. Stylus in flore brevistyllo tantum 2 mm. longus calycem haud aequans, stigmate capitato. Capsula globosa 3 mm. diametro apice valvis dehisca seminibus numerosis angulatis.

"West China:—Yang-dza Shan, Mekong-Salween divide, Yunnan. Lat.  $28^{\circ} 18' N.$  Long.  $98^{\circ} 43' E.$  Alt. 8,900 ft. Plant of 6–20 inches. Flowers white, fragrant. Amongst bush herbage in the proximity of hot-water springs. May 1921." G. Forrest. No 20138.

var. *nana*, W. W. Sm. et Forrest.

Varietas pusilla alpina tantum 2–5 cm. alta.

"Yang-dza Shan. Alt. 11–12,000 ft. Plant of  $\frac{1}{2}$ –2 inches. Flowers fragrant white or white flushed lilac. On boulders and dry stony pasture. April–May 1921." G. Forrest. No. 20140.

The above species appears to be the first member of the Farinosae (in the restricted sense) to occur in Yunnan. Its nearest ally is *P. Knuthiana*, Pax. The variation in size in the various specimens collected is remarkable—from dwarfs of an inch in height to plants of 20 inches. The bracts on the inflorescence do not all spring from the base but are arranged in a spiral series—and naturally the pedicels likewise.

#### *Primula calliantha*, Franch. var. *nuda*, Farrer mss.

Foliis bracteisque calyceque omnino efarinosis a typo recedit.

"Burma:—On the Moku-ji, Chimili and other passes. Alt. 11–13,000 ft. July 14th 1920." R. Farrer. No. 1721.

Mr Farrer has given the following note :—"The whole series on these alps represents not *P. calliantha* at all but the almost exactly similar but efarinose *P. nuda* which last year I only once saw and only in seed [No. 1052]. Here it abounds vastly on the heights sheeting the upper lawns in colour like the Arthritis of Europe. It varies like them too in tones of vinous amethyst or lavender, and, though the lobes are usually entire, specimens occur in which they are erose-dentate."

This at first sight looks very distinct but is not worthy of more than varietal rank. I find in other specimens of *P. calliantha* a tendency to loss of farina. In the Farrerian specimen the dense base of fleshy scale leaves shows within copious farina, although the ordinary leaves, scape, bracts and calyx are quite efarinose.

**Primula Coryana**, Balf. f. et Forrest mss. descr. W. W. Sm.

Species nobilis sectionis Nivalis atque ex affinitate *P. nivalis*, Pallas sed ab ea specie ejusque varietatibus corollae forma facile recognoscitur; quoad habitum atque pulchritudinem cum *P. Agleniana*, Balf. f. et Forrest comparanda.

Planta 35–45 cm. alta farinosa pilosa foliis sub anthesi bene evolutis, alabastri squamis plurimis 3–5 cm. longis 2 cm. latis in sicco tenuiter membranaceis cincta. Folia magna 20–36 cm. longa, 4–8 cm. lata, lanceolata vel oblanceolata, apice acutata nunc apiculata, basi in petiolum lamina breviorem ad 10 cm. longum 1–2 cm. latum pergamantaceum sensim angustata margine crebre atque subregulariter denticulata, dentibus hydathodo apiculatis, utrinque glabra, supra efarinosa vel fere nuda, infra farina albida vel pallido-sulphurea diu persistente undique induta, costa media lata rubida marginibus stramineis (in superficie inferiore conspicua) excepta. Scapus robustus supra dense farinosus umbellas 1–3 superpositas approximatias plerumque 4–9-floras gerens; bracteae ad 1.5 cm. longae lanceolato-acuminatae farina conspersae; pedicelli longiores 2.5–3.5 cm. longi subreflexi dense farinosi. Flores majores ad 4 cm. longi et lati in sicco, roseo-lavendulacei vel roseo-purpurei. Calyx ad 2 cm. longus tubuloso-campanulatus in lobos oblongos vel lanceolato-oblongos acutos ad 12 mm. longos ultra medium fissus extra sparsius, intra densius farinosus. Corollae magnae tubus infundibuliformis ad 2.3 cm. longus, parte inferiore tubulosa circ. 13 mm. longa, parte superiore late ampliata, glaber, extra farina conspersus, lobi ad 1.7 cm. longi, 1.5 cm. lati obovati emarginati nunc margine erosi, ad os latissimum farina copiosa impletum vix annulatus. Stamina in flore longistylo ad medium tubi inferioris inserta, in flore brevistylo

prope os posita; antherae 2.5 mm. longae. Ovarium subgobosum apice incrassatum atque rubido-tinctum; stylus (longus) circ. 8 mm. vix ad os pertinens (brevis) circ. 3 mm.; stigma magnum capitatum. Capsula cylindrica ad 2.7 cm. longa, ad 5 mm. lata, apice valvis brevissimis dehiscens, seminibus nigridis circ. 1 mm. diametro minute papillatis.

"West China:—Mountains around Mu-li; S.W. Szechuan. Lat.  $28^{\circ} 12'$  N. Long.  $100^{\circ} 50'$  E. Alt. 12,000 ft. Plant of 14–18 inches. Under surface of foliage peculiarly aromatic when rubbed. Flowers fragrant, fleshy, soft rose-lavender; throat filled with light sulphur-coloured farina. Half-shady moist situations in conifer and mixed forest. June 1921." G. Forrest. No. 20448.

"Mountains east of Yung-ning, S.W. Szechuan. Lat.  $27^{\circ} 15'$  N. Long.  $101^{\circ} 0'$  E. Alt. 11–12,000 ft. Plant of 12–16 inches. Flowers fragrant, fleshy, soft rosy-purple; throat and tube yellowish-grey. Farina on under-surface of foliage aromatic. Margins of shady forests and thickets and on open meadows. June 1922." G. Forrest. No. 21383.

"Mountains N.E. of Muli, S.W. Szechuan. Lat.  $28^{\circ} 24'$  N. Long.  $101^{\circ} 6'$  E. Alt. 12,000 ft. Plant of 12–18 inches. Flowers fragrant, soft rosy-purple; throat and tube yellowish-grey. Farina on under-surface of foliage peculiarly aromatic. Margins of forests and amongst scrub in side valleys. June 1922." G. Forrest. No. 21413.

"Litang divide. Plant of 15–18 inches. Flowers very large, the petals more or less reflexed, nodding and pushed forward as in *P. vinciflora*. The colour varies from red through purple to violet, large central portion of the corolla silver-white with meal, which also powders the calyx, pedicels and upper portion of the inflorescence-axis. Under surface of leaves brilliant silver. In damp loam under Rhododendrons at the summit of the range. Seen in several places—not uncommon. Generally growing socially. Fragrant. The finest Primula I have ever seen, a truly magnificent Nivalid. June 1921." F. Kingdon Ward. No. 4181.

The following numbers are in fruit:—

"Mu-li mountains. Aug. 1918." G. Forrest. No. 16846.

"Mu-li mountains. Sept. 1918." G. Forrest. Nos. 16984, 17007.

"Mountains around Mu-li. Sept. 1921." G. Forrest. No. 20639.

"Mountains around Mu-li. Sept. 1922." G. Forrest. Nos. 22501, 22502.

A truly noble plant of the Nivalid section and very distinct from the other members of the series. The specific name is

in honour of Reginald Cory, Esq., of Duffryn, Cardiff, to whom the Royal Botanic Garden is indebted for much material collected by George Forrest in Western China. The name was attached by Sir Isaac Bayley Balfour to the original fruiting specimens, but no description has been found.

**Primula Dickieana**, Watt var. **Pantlingii** (King).

"S.E. Tibet :—Salween-Kiuchiang divide, Tsarong. Lat.  $28^{\circ} 20'$  N. Long.  $98^{\circ} 27'$  E. Alt. 14–14,500 ft. Plant of 2–3 inches. Flowers purplish-blue, throat and tube yellow. Moist alpine pasture. July 1921." G. Forrest. No. 19886.

"S.E. Tibet :—Salween-Kiuchiang divide, N.W. of Si-chi-to, Province of Tsarong. Lat.  $28^{\circ} 35'$  N. Long.  $98^{\circ} 28'$  E. Alt. 14–14,500 ft. Plant of 2–4 inches. Flowers deep lavender-blue, eye yellow, fragrant. On open moist alpine meadows. May 1922." G. Forrest. No. 21633.

In fruit. July 1921. G. Forrest. No. 19975; in fruit. Sept. 1921. G. Forrest. No. 20271; in fruit. Oct. 1921. G. Forrest. No. 20856; in fruit. Oct. 1922. G. Forrest. No. 22814.

We are unable to separate these specimens collected in S.E. Tibet from the Himalayan *P. Dickieana*, Watt or its ally *P. Pantlingii* which latter seems to us to be only a 1–2-flowered variety of *P. Dickieana*. Hitherto *P. Dickieana* was known only from Sikkim where it is a comparatively rare species. Its foliage is peculiarly gland-dotted and the S.E. Tibet specimens show the same character. We would add here that *P. Valentiniana*, Hand.-Mzt. shows the same sunken glands and resembles *P. Dickieana* in foliage characters. In *P. Valentiniana*, however the flowers are pendent and the calyx entirely different. It has been referred by its author to the group of the Amethystinae. Its affinity is certainly with *P. Dickieana*, whatever the correct section may be.

var. **chlorops**, W. W. Sm. et Forrest.

In eisdem locis crescens sed floribus minoribus plerumque 2–3-natis saturate purpureo-coeruleis, oculo viridi nec flavido praeditis divergere videtur.

"S.E. Tibet :—Salween-Kiuchiang divide, Tsarong, west of Chamatong. Lat.  $28^{\circ} 18'$  N. Long.  $98^{\circ} 27'$  E. Alt. 14,000 ft. Plant of 2–4 inches. Flowers deep purple-blue, eye green. On moist stony meadows. June 1922." G. Forrest. No. 21674.

A variety more removed from *P. Dickieana* than the var. *Pantlingii*.

**Primula dumicola**, W. W. Sm. et Forrest.

Species ex affinitate *P. obconicae*, Hance atque *P. sino-Listeri*, Balf. f. a quibus foliorum forma atque aspectu, umbellis saepe superpositis divergit; quoad inflorescentiam *P. malacoidem*, Franch. suggestit sed est efarinosa atque indumento pilorum longorum albidorum differt.

Planta 10-30 cm. alta efarinosa. Folia ad 10 cm. longa; lamina late ovalis vel suboblonga, ad 5 cm. longa, ad 4 cm. lata, apice ambitu rotundata, basi plerumque breviter cordata nunc subtruncata, margine circ. 11-lobulata, lobulis inciso-dentatis, supra pilis articulatis albidis bene conspersa, intra praesertim ad nervos marginemque pilis eisdem praedita; petiolus laminam subaequans longiuscule albido-araneoso-pilosus. Scapi plures (2-5) ad 30 cm. alti sat robusti paulo flexuosi nunc basi ascendentibus undique albido-pilosii umbellam plurifloram vulgo 6-10-floram saepe duas superpositas gerentes; bracteae linearis vel sublineares 4-7 mm. longae albido-pilosae, pedicelli 8-13 mm. longi stricti pilis albidis conspersi. Calyx 4-5 mm. longus in fructu (vix maturo) ad 6-7 mm. ampliatus campanulatus, viridis pilis longis albidis bene conspersus in lobos erectos triangulares acutus ad tertiam vel quartam partem fissus. Corollae roseae oculo albido-flavo tubus fere 7 mm. longus cylindricus glaber intra vix annulatus, lobi 3 mm. longi obtuse apice emarginati. Stamina in flore brevistyllo vix supra medium inserta atque stylum paululo superantia. Ovarium globosum; stylus brevis calyce brevior. Capsula haud matura globosa calycis tubo inclusa.

"S.E. Tibet:—Near Hsi-ku, on the descent from the Londre La to the Salween valley, Salween-Mekong divide, Yunnan. Lat.  $28^{\circ} 14'$  N. Long.  $98^{\circ} 38'$  E. Alt. 11,000 ft. Plant of 4-12 inches. Flowers fragrant, rose, with eye yellowish white. On the margins of thickets by streams. May 1922." G. Forrest. No. 21657.

**Primula effusa**, W. W. Sm. et Forrest.

Species valde affinis *P. malacoidei*, Franch. et *P. Forbesii*, Franch.; a priore foliis carnosulis subreniformibus margine subregulariter dentatis, tubo corollae calycem duplo superante inter alia divergit; ab altera foliis longe petiolatis cordato-reniformibus margine valde diverso praeditis praeferuntur alia signa distinguuntur.

Planta ad 50 cm. alta, haud annua, radice sat robusta praedita, gemmas proferens. Folia numerosa cum petiolo ad 15 cm. longa; lamina majorum 4.5 cm. longa et lata, cordato-reniformis apice plus minusve rotundata, basi plerumque alte cordata, paululo sinuato-lobata, margine argute atque subregulariter

dentata, utrinque sparsim hispida cito subglabrescens; petiolus ad 12 cm. longus laminam longe superans, pilis longiusculis bene conspersus. Scapi plures, nunc 8, ad 50 cm. alti flexuosi graciles glabri efarinosi umbellas superpositas 2-3 intervallis 5-8 cm. longis plurifloras (5-16-) gerentes; bracteae 3-4 mm. longae virides lineares glabrae; pedicelli ad 5 cm. longi inaequales substricti glabri vel subglabri. Calyx ad 4 mm. longus anguste campanulatus viridis sparsim albo-farinosis ad medium in lobos anguste lanceolatos acutos fissus, in fructu multo latior atque ad 5 mm. elongatus. Corollae lavendulaceo-roseae tubus 8 mm. longus anguste cylindricus extra flavidus vix annulatus, lobi ad 6 mm. longi obtuse alte emarginati. Stamina filamentis brevissimis in flore longistyle infra medium tubi corollini inserta, in flore brevistyle circ. ad medium posita. Ovarium subglobosum; stylus longus inclusus vix ultra medium tubi corollini pertinens, brevis calycis tubo paulo brevior. Capsula globosa calycis tubo paululo exserta ab apice valvis 5 crustaceis dehiscens, seminibus 0.5 mm. diametro brunneis subdisciformibus nunc angulatis.

"West China :—Yangtze-Yung-ning divide; Yunnan. Lat.  $27^{\circ} 40'$  N. Alt. 7-8000 ft. Plant of 10-20 inches. Foliage fleshy. Flowers lavender-rose, fragrant. Shady moist situations in thickets. June 1914." G. Forrest. No. 12446.

"West China :—On the descent to Fengkow on the Yangtze, Yunnan. Lat.  $27^{\circ} 35'$  N. Long.  $100^{\circ} 30'$  E. Alt. 11,000 ft. Plant of 6-12 inches. Flowers rose fragrant. Foliage fleshy, leathery. Shady moist banks on slate formation. Note—this is not the true *P. malacoides*—it was first collected in June 1913. May 1922." G. Forrest. No. 21236.

"West China :—Fengkow, Yunnan. By irrigation streams amongst grass and ferns in the cultivated terraces below Fengkow and just above the Yangtze. The rootstock appears to be perennial. Alt. 7000 ft. Flowers pinkish-mauve with white eye and orange tube, darkly striped. Leaves almost glabrous or with a few scattered bristly hairs; under surface powdered with white meal. Meal also on calyx, pedicels, etc. April 15th, 1922." Kingdon Ward. No. 5044.

In Mr Forrest's opinion too distinct a plant to be reckoned as a variety of either *P. malacoides* or of *P. Forbesii*. In its fresh condition the leaves are succulent like the leaves of some of the Diptera Saxifrages but dry to a very thin consistency. It is found only on moist slate formations.

#### *Primula eucyclia*, W. W. Sm. et Forrest.

Species inter congeneres chinenses facile distincta atque cum *P. vaginata*, Watt specie himalayensi tantum comparanda; ab

illa foliis textura tenuioribus magis regulariter orbiculatis, floribus 1-3-natis plerumque binis, corollae tubo atque limbo fere duplo majoribus divergit; petiolis basi manifeste vaginatis species hae duae conspicuae.

Planta perennis ad 8 cm. alta rhizomate elongato anguste cylindrico basibus foliorum delapsorum bene obsito. Folia saepe ad 12, alia petiolo ad 4 cm. longo basi vaginante praedita, alia (miniora) petiolo vix 2 mm. longo munita sed vagina lata ad 1 cm. longa et 4 mm. lata margine ciliolata instructa; lamina vulgo 2.5 cm. diametro, ambitu orbicularis, basi cordata, ad medium subseptemloba, lobis ad trientem incisis, lobulis acutiusculis, supra minute puberula, sub lente quasi scabridula, infra pallidior glabra vel subglabra, margine minute ciliolata. Scapus ad 8 cm. altus gracilis folia superans minutissime puberulus umbellam plerumque bifloram gerens; bractae 2-4 lanceolatae 3-4 mm. longae acutae minute ciliolatae; pedicelli graciles 7-9 mm. longi minute puberuli. Calyx late campanulatus circ. 5 mm. longus ad medium fissus glaber vel subglaber; lobii ovati obtusiusculi margine minutissime ciliolati. Corollae pallide roseae tubus cylindricus fere 1 cm. longus ore annulatus; limbus 1.6-1.8 cm. latus in lobos obovatos 4-5-dentatos dentibus truncatis divisus. Stamina in flore longistyllo calycem paululo superantia. Ovarium subglobosum; stylus in flore brevistyllo calycem aequans, in flore longistyllo ad summum corollae tubum attingens; stigma parvum capitatum. Fructus ex calyce haud aucto vix exsertus subglobosus apice valvis 2-5 dehiscens; semina pauca 1 mm. diametro paulo complanata minute areolata.

"S.E. Tibet:—Province of Tsarong, Salwin-Kiuchiang divide, N.W. of Si-chi-to. Lat.  $28^{\circ} 35'$  N. Long.  $98^{\circ} 28'$  E. Alt. 14,000 ft. Plant of  $\frac{1}{2}$ - $\frac{1}{2}$  inches; perennial. Flowers pale shell-pink. On rocks and stony alpine meadows. May 1922." G. Forrest. No. 21632.

"Lat.  $28^{\circ} 20'$  N. Long.  $98^{\circ} 27'$  E. On open alpine meadows. In fruit. July 1921." G. Forrest. No. 19868.

"Lat.  $28^{\circ} 24'$  N. Long.  $98^{\circ} 24'$  E. Alt. 14-15,000 ft. In fruit. Sept. 1921." G. Forrest. No. 20270.

This species is the Chinese representative of the Himalayan *P. vaginata*, Watt. As in that species the leaves are markedly dilated at the base into a broad vagina. *P. eucyclia* is a slenderer plant than the Himalayan with fewer but much larger flowers.

#### *Primula gentianoides*, W. W. Sm. et Ward.

Species anomala cuius affinitas nobis dubia est; scapis cuique plantulae 1-4 ebracteatis unifloris, floribus magnis praecocibus,

corollae lobis valde elongatis integris, staminibus styloque non vel vix calyeis tubum superantibus inter alia signa bene conspicua.

Planta sub anthesi ad 6 cm. alta epilosa efarinosa basi squamis carnosulis 1-1.5 cm. longis obsita radicibus crassiusculis praedita. Folia sub anthesi haud bene evoluta petiolo alato laminam subaequante praedita; lamina circ. 1.5 cm. longa, vix 1 cm. lata, late spatulata, apice rotundata, basi in petiolum sensim angustata, integra vel subintegra, carnosula atroviridis glabra. Scapi 1-4, longitudine flores aequantes sub calyce sensim ampliati uniflori axillares glabri. Flores in sicco 3 cm. longi erecti glabri pallido-coeruleo-violacei. Calyx 8-9 mm. longus late tubulosus viridis textura tenuis glaber in lobos ovatos erectos apice rotundatos fere ad medium fissus. Corollae textura gracillimae tubus 11-12 mm. longus late cylindricus supra paululo dilatatus extra glaber, lobi 17-18 mm. longi oblanceolati medio 8 mm. lati apice rotundati integri; os exannulatus sed capillis longiusculis delicatis munitus ut tubus intus. Stamina in flore-longistylo tantum 2 mm. a basi tubi corollini remota, in brevistylo calycis tubum paulo superantia, antheris circ. 1.5 mm. longis. Stylus longus circ. 5 mm., brevis vix 3 mm. superans; stigma capitatum; ovarium globosum placentia ut videtur pulvinato-discoidea, seminibus immaturis multis. Fructus deest.

"West China:—Yungning, N.W. Yunnan. Alt. 12-13,000 ft. Flowers pale bluish violet with no meal. Leaves glabrous with no meal. In open grassy meadows along the summit of the forested range. 25th April 1922." F. K. Ward. No. 5088.

A very peculiar species. The plant is dwarf but the flowers are large and precocious. There may be one to four scapes to each plantlet and the scapes are single-flowered and ebracteate. The habit in some ways recalls *P. sonchifolia*, Franch., but the structure of the flower is very different. The one-flowered ebracteate scapes lead mechanically to *Omphalogramma* but the calyx and corolla do not accord with that genus; there is, moreover, the want of any indumentum; the inside of the tube is lined with very fine but longish hairs but not forming a tuft in the throat as in the Bella section. It may be placed provisionally in the Petiolaris section. The placenta is broad and convex with the seeds lying upon it. This may point to it being an aberrant Petiolaris (cf. Balf. f. in Notes, R.B.G., Edin. IX. (1916) p. 175 sub *P. hylophila*.)

#### *Primula ingens*, W. W. Sm. et Forrest.

Ex affinitate *P. russeolae*, Balf. f. et Forrest et *P. sinonivalis*, Balf. f. et Forrest a quibus habitu multo elatiore, scapo pedi-

cellisque dense luteo-farinosis, floribus pernumerosis divergit; omnes pro subspeciebus *P. nivalis*, Pall. fortasse rectius aestimari debent.

Planta florifera ad 50 cm. alta vel ultra, in fructu ad 90 cm. attingens, farinosa epilosa radicibus multis crassis; foliorum rosula sub anthesi bene evoluta, alabastri squamis plurimis ad 8 cm. longis, 3 cm. latis rubidis in sicco tenuiter membranaceis cincta. Folia magna ad 33 cm. longa, ad 5 cm. lata, lanceolata vel oblongo-lanceolata apice acutata vel obtusa, deorsum in petiolum late alatum attenuata margine integra vel nunc obscure denticulata, supra nuda, subtus sparsim luteo-farinosa cito subnuda; petiolus 8–9 cm. longus, ad 2 cm. latus, in sicco tenuiter membranaceus rubidus squamis basalibus subsimilis. Scapus robustissimus apicem versus dense luteo-farinosus umbellam multifloram vel duas superpositas gerens; bracteae 6–20 mm. longae lanceolatae acuminatae sparsim farinosae margine ciliolatae; pedicelli circ. 1.5 cm. longi, in fructu 4–8 cm. longi, reflexi vel superiores subreflexi (in fructu erecti), dense luteo-farinosi; anthopodium magnum. Calyx ad 12 mm. longus tubuloso-campanulatus ad medium in lobos lanceolatos vel suboblongos acutatos fissus extra fere nudus atro-viridis vel atro-brunneus intus dense farinosus venis distinctis longitudinaliter pererratus. Corollae purpureo-coeruleae tubus ad 1.5 cm. longus infundibuliformis glaber annulo distincto praeditus, lobii obovati vel subrotundati 1–1.5 cm. longi integri margine pilis minutis glanduli-capitatis muniti. Stamina in flore longistyle ad partem tubi corollini quartam inferiorem inserta antheris circ. 2.5 mm. longis. Ovarium subglobosum in dimidio superiore incrassatum atque rubro-tinctum; stylus (longus) 7–8 mm. longus haud exsertus; stigma capitatum. Capsula cylindrica 1.5–2 cm. longa e calyce venoso exserta straminea apice valvis dehiscens seminibus circ. 1.5 mm. longis brunneis spongiosis.

"West China:—Bei-ma Shan, Yunnan. Lat.  $28^{\circ} 18' N.$  Long.  $99^{\circ} 10' E.$  Alt. 14–15,000 ft. Plant of 12–20 inches. Flowers fragrant soft purple-blue with grey eye. Open stony meadows by streams. June 1921." G. Forrest. No. 19849.

"Bei-ma Shan. Plant of  $2\frac{1}{2}$ –3 ft. In fruit. Flowers shades of lavender and purple-blues, occasionally pale rose; fragrant. On moist pasture by streams. This is the most robust and one of the most beautiful Nivalid Primulas I know. Sept. 1921." G. Forrest. No. 20397.

"Na-shu-to Shan, Mekong-Yangtze divide, Yunnan. Lat.  $28^{\circ} 30'$ . Long.  $99^{\circ} 12' E.$  Alt. 14,500. Plant of  $2\frac{1}{2}$ –3 ft. In fruit. On open meadows by streams. Oct. 1921." G. Forrest. No. 20617.

The above plant appears to come nearest *P. sino-nivalis* and *P. russoela*. In habit it has a strong resemblance to the white-flowered *P. chionantha*, Balf. f. et Forrest. With these it must be placed as one of the many members of the aggregate *P. nivalis*, Pall. It should prove a magnificent species in cultivation if as amenable as *P. chionantha*.

**Primula lacerata**, W. W. Sm.

Species burmanica affinis *P. Veitchiana*, Petitm. atque *P. pirolaefoliae*, Lévl. (quae fortasse sunt eadem); glandulae peculiares in bracteis et calycibus et corollis plantarum supra citatarum in *P. lacerata* omnino desunt; foliorum textura atque corollae laciniis insuper ab eis removitur.

Planta 15–18 cm. alta scapis 3–9 folia longe superantibus. Folia petiolo 2–6 cm. longo minute puberulo praedita; lamina 2–4.5 cm. longa et lata, orbicularis vel suborbicularis, apice rotundata, basi breviter cordata nunc vix cordata, margine obscure crenato-dentata, textura chartacea, subtus subglauca utrinque glabra. Scapi axillares ad 18 cm. alti minutissime puberuli 3–7-flori; bracteae 3–4 mm. longae anguste lanceolatae subglabrae (nonnunquam singula ex involucro longe petiolata atque laminam 1–2 cm. diametro gerens); pedicelli circ. 1 cm. longi, in fructu ad 2.5 cm. elongati, dense furfuraceo-puberuli; flores erecti fragrantes lavendulaceo-coerulei oculo aurantiaco. Calyx circ. 7 mm. longus anguste campanulatus minutissime puberulus vel subglaber in lobos ovatos subacutos vel obtusiusculos circ. 3 mm. longos fere ad medium fissus. Corollae tubus calycem paululo superans cylindricus, annulus distinctus convolutus, lobi circ. 8 mm. longi anguste obovati bilobi lobulis ipsis pectinato-incisis. Stamina in flore longistyllo multo supra medium tubi corollini inserta, antheris circ. 1 mm. longis ad annulum pertinentibus, in flore brevistyllo antherae ex ore exsertae. Stylus in flore longistyllo ex ore saltem 3 mm. exsertus, in flore brevistyllo calycem paululo superans. Capsula fere matura globosa seminibus multis angulatis; dehiscentiam non observavi.

"N.W. Burma:—Between Shingrup Chet and Akhyang. Alt. 7,500 ft. On ledges of hard shale bluffs, on moss on dead trunks and on pathside banks of the uppermost rain-forest or lowest alpine. Flowers almost over by April 15th, in shades of lavender-blue with an orange eye, very fringy and sweetly scented like *P. farinosa*. Range seems limited, no sign of it was seen on the east side of the pass and it was only found within a very small belt of the western. Seen again on one little wet granitic cliff-gully at 8000 ft. on the wooded crest

(Kum la Bum) between Kenglungpu and Salangpa, in full flower and character. Its beauty is remarkable and its flower-form so very unstable that it should develop widely in cultivation. The eye can be a solid ring of orange or a mere many-rayed corona with a penumbra of pallor. Note too the far exserted style. Nowhere seen in the woods of the Upper Akhyang. April 1920." R. Farrer. No. 1512.

A very beautiful species not yet in cultivation. It has no affinity with any Himalayan or Burmese species known to me but comes very near to the Szechwan *P. Veitchiana*, Petitm., as well as the eastern Yunnan plant described by Léveillé as *P. pirolaeifolia*. Of this last I have ample material; of *P. Veitchiana* only a scrap. But both are characterised by peculiar internal glandular areas in the bracts and calyx-lobes while the corollas of both are sprinkled with dark glandular dots. Microscopic examination confirms the glandular nature of these marks which are visible from without. *P. lacerata* is devoid of these but its close relationship with the Chinese plants is undoubtedly. *P. Veitchiana* and *P. pirolaeifolia* appear to me to be the same species but unfortunately my material of the former is very limited. These plants appear to be connected with the section *Carolinella* in which they are placed provisionally. They agree with one another in the laciniation of the corolla-lobes—not simply emarginate as in the typical members of that section.

#### *Primula leucops*, W. W. Sm. et Ward.

Ex affinitate *P. atuntzuensis*, Balf. f. et Forrest et *P. sinoplaginaceae*, Balf. f.; planta nana sectionis Nivalis; foliis angustissimis, floribus pro planta magnis, corollae oculo magno albo bene notata.

Planta dense caespitosa ad 6 cm. alta, in fructu nunc vix accrescens, nunc paulo altior, pallido-luteo-farinosa. Folia 2-3 cm. longa, 3-5 mm. lata, petiolo vix discreto alato praedita, sub anthesin vix omnino evoluta; lamina lineari-lanceolata vel anguste lanceolata, acuta vel subacuminata, marginibus revolutis obscure crenato-denticulata, subtus farinosa. Scapus foliis duplo longior umbellam 2-5-floram gerens; bracteae 4-5 mm. longae pedicellos plus minusve aequantes basi latae lanceolatae acutae vel acuminatae virides vel nunc purpurascentes leviter farinosae. Calyx circ. 8 mm. longus cylindricus atropurpureus intus dense farinosus in lobos oblongos subacutos ultra medium fissus. Corollae lilicinae vel purpureae oculo valde conspicuo tubus circ. 1 cm. longus supra calycem ampliatus, lobi subrotundati 1 cm. diametro integri. Stamina in flore brevistyllo

supra medium tubum inserta antheris 1.5 mm. longis ab ore 2 mm. remotis. Stylus in flore brevistilo vix calycis tubum superans. Capsula cylindrica 1.5 cm. longa.

"West China :—Gu-ja-la, Muli district, S.W. Szechwan. Alt. 15–16,000 ft. Flowers various shades of mauve, lilac and purple but always with white eye. Fragrant. On open alpine slopes. May 1922." F. K. Ward. No. 5133.

The aggregate *P. nivalis*, Pall. and its allied species appear to be prolific in West China in the development of various subspecies and varieties. At one extreme there are tall plants such as *P. ingens*, attaining 3 ft. in the fruiting stage and at the other dwarf plants such as *P. atuntzuensis*, *P. brevicula*, *P. minor*, *P. petraea*, and *P. rigida*. *P. leucops* finds a place with these last.

#### **Primula lichiangensis, Forrest var. hapala, Balf. f. et Forrest.**

Varietas foliis subtus plus minus dense albido-araneosotomentosa a planta typica divergens.

"West China :—Mountains east of Yung-ning, S.W. Szechuan. Lat.  $27^{\circ} 48'$  N. Long.  $101^{\circ}$  E. Alt. 12–13,000 ft. Plant of 8–12 inches. Flowers fragrant, dark purple-rose, eye orange. On ledges of dry limestone cliffs. June 1922." G. Forrest. No. 21227.

"Eastern flank of the Bei-ma Shan, Yunnan. Lat.  $28^{\circ} 12'$  N. Alt. 12–13,000 ft. On rocks and humus-covered boulders. June 1917." G. Forrest. No. 13848.

#### **Primula Littoniana, Forrest var. robusta, Forrest.**

A typo habitu robustiore, foliis majoribus, spica multo longiore ad 35 cm. longa apicem versus multo attenuata, floribus pallide lavendulaceis divergit.

"West China :—Mountains S.E. of Mu-li, S.W. Szechuan. Lat.  $27^{\circ} 30'$  N. Long.  $101^{\circ}$  E. Alt. 11,000 ft. Plant of 2–2½ ft. Flowers pale purplish-blue. Open moist meadows on the margins of conifer forests. Aug. 1922." G. Forrest. No. 22179.

In fruit. Sept. 1922. G. Forrest. Nos. 22490, 23246.

This variety has been found so far only on the mountains around Mu-li. All the plants of *P. Littoniana* in the area are the same. In other areas where typical *P. Littoniana* occurs, this giant form has not been seen. It has been in cultivation, but, although its spike may attain sometimes 15 inches in length, its paler-coloured flowers do not make it so attractive a plant as the typical form.

**Primula malvacea**, Franch. var. **alba**, Forrest.

A typo floribus albis recedit.

"West China :—Sungkwei Range, Yunnan. Lat.  $26^{\circ} 18'$  N. Long.  $100^{\circ} 12'$  E. Alt. 10-11,000 ft. Plant of 9-14 inches. Flowers fragrant, pure white with yellowish eye and tube. On open alpine meadows. July 1922." G. Forrest. No. 21557.

**Primula malvacea**, Franch. var. **intermedia**, W. W. Sm. et Forrest.

Varietas nana *P. malvacea*, Franch.; quoad habitum foliaque ad *P. blattariformem*, Franch. spectans sed inflorescentia *P. malvacea* praedita; folia plerunque breviter petiolata; flores in umbellis superpositis sed, si nunc racemose dispositi, pedicellis elongatis muniti.

"West China :—Mountains of the Chungtien plateau, Yunnan. Lat.  $27^{\circ} 30'$  N. Alt. 11,000 ft. Plant of 3-6 inches. Flowers very pale rose. Open stony pasture. July 1914." G. Forrest. No. 12586.

"Muli mountains, valley of the Litang, S.W. Szechuan. Lat  $28^{\circ} 12'$  N. Alt. 10,000 ft. Plant of 4-9 inches. Flowers rose with eye yellow. Stony pasture and on ledges of cliffs. July 1918." G. Forrest. Nos. 16276, 16495, 16795.

"Muli. Alt. 9-10,000 ft. Flowers large for the size of the plant, delicate mauve with white eye. On shady limestone cliffs or in the woods below the cliffs. A charming little plant of refined colour not, however, fragrant. July 1921." F. K. Ward. No. 4521.

"Mountains east of Yung-ning, S.W. Szechuan. Lat.  $27^{\circ} 48'$  N. Long.  $101^{\circ}$  E. Alt. 9-10,000 ft. Plant of 4-10 inches. Flowers rose. Open stony slopes and on cliffs and rocks in dry side valleys. June 1922." G. Forrest. No. 21425.

**Primula melanops**, W. W. Sm. et Ward.

Ex affinitate *P. sinopurpureae*, Balf. f. et *P. sinoplantagineae*, Balf. f. atque cum eis pro microforma *P. nivalis*, Pall. habenda. Ad *P. sinopurpuream* potius approximat sed minor, foliis subtus albido-farinosis, floribus saturate atro-purpureis oculo nigro ornatis, capsula magna cylindrica ad 2.5 cm. longa. Planta florifera 10-15 cm. alta, in fructu nunc ad 35 cm. elata.

"West China :—Litang divide, S.W. Szechwan. Alt. 15,000 ft. Flowers deep Tyrian purple, black in the centre, fragrant. On screes by glacier lake under the lee of rocks. June 1921." F. K. Ward. No. 4080.

"Gu-ja-la, S.W. Szechwan. Alt. 14-15,000 ft. Flowers deep Tyrian purple, the eye darker almost black. On open alpine slopes facing the sun. June 1922." F. K. Ward. No. 5132.

Another member of the aggregate *P. nivalis*, Pall.

**Primula microstachys**, Balf. f. et Forrest.

Planta nana affinis *P. blattariformi*, Franch. cujus pro varietate vel microforma rectius aestimanda; omnibus partibus multo minoribus à planta typica recedit.

Herba 7-20 cm. alta. Folia petiolo 5-10 mm. longo dense pubescente munita; lamina ad 3 cm. longa, ad 2 cm. lata, late oblonga vel ovalis, apice rotundata, basi late cuneata vel subrotundata, ut ea *P. blattariformis* induta. Scapus gracilis dense pubescens flores 3-12 racemose dispositos gerens; bracteae linearis ad 5 mm. longae; pedicelli 1-3 mm. longi. Calyx circ. 5 mm. longus. Corollae roseae oculo flavo tubus circ. 1 cm. longus anguste cylindricus gracillimus, lobi 5-7 mm. longi cuneato-obovati alte emarginati. Stamina in flore longistylō ad medium tubi corollini inserta. Stylus fere ad os annulatum pertinens.

"West China:—Mekong-Yangtze divide, Yunnan. Lat. 27° 40' N. Alt. 9-10,000 ft. Plant of 3-8 inches. Flowers rose, eye yellow. Open stony pasture. Aug. 1914." G. Forrest. No. 13137.

A very different looking plant from *P. blattariformis*, Franch. at first sight, of dwarf habit and with very slender flowers and narrow corolla tube. But it will probably prove to be an extreme variety of that species.

**Primula monantha**, W. W. Sm. et Forrest.

Species affinis *P. gemmiferae*, Batal. atque *P. chrysopae*, Balf. f. et Forrest a quibus habitu multo minore, foliis fere orbiculatis, floribus solitariis recedit.

Planta nana 3-6 cm. alta radicibus paucis gracilibus. Folia 5-6 rosulam parvam formantia, petiolo alato latiusculo laminam plus minusve aequante praedita; lamina 7-9 mm. longa, 6-7 mm. lata, vel nunc minor, suborbicularis vel late spathulata, apice rotundata, basi subabrupte in petiolum contracta, margine dentibus ± 20 glanduli-capitatis instructa, textura carnosula, utrinque levissime albo-farinosa epilosa. Scapus ad 6 cm. longus flexuosus leviter albo-farinosis florem solitarium suberectum gerens; bracteae 2, major circ. 4 mm. longus, minor 2 mm., anguste lanceolatae acutae basi obscure gibbosae albo-farinose ut pedicelli circ. 5 mm. longi. Calyx circ. 5 mm.

longus anguste campanulatus extra leviter farinosus intus densius in lobos ovato-lanceolatos acutos ad medium fissus. Corollae glabrae purpureo-roseae tubus circ. 9 mm. longus cylindricus supra sensim ampliatus, lobi obovati circ. 9 mm. longi emarginati. Stamina in flore longistylō ad medium tubum inserta. Ovarium globosum; stylus in flore longistylō ad os pertinens; stigma capitatum. Fructus deest.

"West China :—Mekong-Yangtze divide, Yunnan. Lat.  $27^{\circ} 36'$  N. Long.  $99^{\circ} 10'$  E. Alt. 14,500 ft. Plant of  $1\frac{1}{2}$ - $2\frac{1}{2}$  inches. Flowers soft purplish-rose. On moist stony pasture. July 1921." G. Forrest. No. 19678.

We have little doubt of the affinity of this dwarf species with *P. gemmifera*, Batal. and *P. chrysopa*, Balf. f. et Forrest. It is distinguished easily by the rounded pluridentate small leaves and the solitary flowers. Only one collection was made and in the area the plant appeared to be very rare.

### *Primula oxygraphidifolia*, W. W. Sm. et Ward.

Species nana valde distincta cujus affinitas est cum *P. tibetica*, Watt, atque *P. fasciculata*, Balf. f. et Ward, a quibus foliis diversis, floribus multo majoribus solitariis (ut in *P. fasciculata*), calycis lobis obtusis praeter alia signa removitur.

Planta 3-5 cm. alta caespitosa efarinosa epilosa rhizomate parvo vaginis emarcidis foliorum vetustorum induito. Folia petiolo 8-18 mm. longo alato praedita; lamina variabilis nunc late ovata circ. 1 cm. longa et 7 mm. lata, nunc fere orbicularis vel ovato-lanceolata vel lanceolata, apice rotundata vel obtusa, basi rotundata vel in foliis angustioribus in petiolum angustata, margine integra vel dentibus 1-3 utrinque munita, textura in sicco carnosula, supra atroviridis subtus olivacea; folia anni prioris saepe persistentia et aspectu albo-spongiosa. Scapus ad 5 cm. longus axillaris ad medium bracteis 1-2 membranaceis circ. 2 mm. longis appressis lanceolatis acutis munitus. Calyx 6-7 mm. longus anguste campanulatus glaber efarinosus in lobos oblongos circ. 3 mm. longos et 1.5 mm. latos apice rotundatos nunc undulato-erosos fissus; lobi atque juga viridia intervallis pallido-viridibus submembranaceis. Corollae lavendulaceo-coeruleae glabrae tubus 11-12 mm. longus cylindricus supra paulo dilatatus, annulus valde distinctus, lobi 8 mm. longi obcordati alte emarginati. Stamina in flore longistylō calycis tubum medium haud superantia, in flore brevistylō paulo supra medium tubum corollinum inserta. Ovarium globosum; stylus longus vix ad os pertinens, brevis vix 1 mm. superans; stigma capitatum. Fructus (ex reliquiis anni prioris) haud exsertus apice valvis dehiscens.

"Muli Range. Flowers mauve or purplish, with pale yellow eye. No meal. On limestone precipices in nooks and crannies. Not common. Plants nearly always occur singly, with one large flower closely pressed against the rock. The previous year's leaves clothe the stem. 5th June 1921." F. K. Ward. No. 4182.

"Muli Range. Alt. 15,000 ft. Flowers solitary and without meal. Grows at high altitudes on the limestone cliffs in mossy crevices. 15th June 1922." F. K. Ward. No. 5222.

"Mountains around Mu-li, S.W. Szechuan. Lat.  $28^{\circ} 12' N.$  Long.  $100^{\circ} 50' E.$  Alt. 12,000 ft. Plant of 1-2 inches. Flowers lavender-blue, eye grey-yellow. Open stony moist pasture by streams. July 1921." G. Forrest. No. 20473.

"Mountains N.E. of Mu-li. Lat.  $28^{\circ} 22' N.$  Long.  $101^{\circ} 6' E.$  Alt. 12-13,000 ft. Plant of  $1\frac{1}{2}$ -2 inches. Flowers fragrant, deep lavender, tube white. Open stony moist alpine meadows by streams. June 1922." G. Forrest. No. 21332.

A peculiar species akin to *P. tibetica*, Watt. The scapes are one-flowered. The leaves of the previous year are sometimes persistent, drying to a white spongy appearance.

#### *Primula Pauliana*, W. W. Sm. et Forrest.

Species in sectione Geranioides inflorescentiis elongatis laxe racemosis secundifloris atque floribus pallide flavis valde conspicua.

Planta satis robusta 25-40 cm. alta. Folia 3-9 petiolo ad 18 cm. longo pilis articulatis sparsim instructo munita; lamina foliorum majorum ad 9 cm. longa, ad 8 cm. lata, orbiculari-ovata, basi cordata, textura in sicco tenuissima, ad partem quintam subseptemloba, margine grossi-dentata atque ciliolata, supra glabra vel hic illic pilis articulatis sparsim praedita, infra pallidior ad nervos rubidos basi radiantes pilis similibus bene conspersa. Scapus ad 40 cm. longus, gracilis flexuosus supra medium floriferus, pilis articulatis paucis atque pube minuta indutus; inflorescentia elongata laxe racemosa 20-30-flora secundiflora; bractae 3-5 mm. longae plerumque lanceolatae vel sublineares integrae, nunc oblongae apice 3-4-lobulatae, pubescentes, nonnunquam pedicello suffultae; pedicelli 6-10 mm. longi ut scapus induti. Calyx 6 mm. longus minute puberulus ad medium in lobos triangulares acuminatos indurato-apiculatos fissus. Corollae pallido-flavae tubus aurantiacus circ. 11 mm. longus anguste cylindricus extra minutissime pubescens obscure annulatus; limbus circ. 16 mm. diametro lobis obovatis alte emarginatis. Stamina in flore longistylō in partem inferiorem tubi corollini disposita, tubum calycis vix superantia, in flore

brevistylo ad os corollinum inserta. Ovarium globosum; stylus subexsertus in flore longistyle, in flore brevistylo ovarium aequans atque vix tubum calycis superans, glaber; stigma capitatum. Fructus circ. 9 mm. longus e calyce haud aucto exsertus, oblongus, apice dentibus parvis dehiscens.

"West China:—S.W. Szechwan, in the mountains S.E. of Yung-ning. Lat.  $27^{\circ} 30'$  N. Long.  $100^{\circ} 50'$  E. Alt. 11–12,000 ft. Plant of 9–16 inches. Flowers pale yellow, eye and tube orange. Margins of thickets and forests and on open meadows. Aug. 1922." G. Forrest. No. 22073. Also Sept. 1922. No. 22452 in fruit.

A striking species of the Geranioides series and apparently the only yellow-flowered member of that series. The very elongate lax racemose inflorescence is also an easy mark for recognition. The specific name is in honour of the Very Rev. David Paul, D.D., LL.D., an enthusiastic student of the European Primulaceae.

#### *Primula pseudosikkimensis*, Forrest.

Microforma *Primulae sikkimensis*, Hook.; planta calcicola habitu humiliore, foliis textura minus flaccidis, floribus intensius atque laete luteis a planta typica divergit. Plantae ambae in provincia yunnanensi crescent; *P. pseudosikkimensis* montibus calcareis Lichiang dictis favet.

"West China:—Lichiang Range, Yunnan. Lat.  $27^{\circ} 20'$  N. Alt. 11–12,000 ft. Plant of 12–18 inches. Flowers bright canary-yellow, fragrant. In crevices and ledges of limestone cliffs. July 1906." G. Forrest. No. 2642.

"Eastern flank of the Lichiang Range. Alt. 12–15,000 ft. Plant of 6–9 inches. Flowers soft canary-yellow, fragrant. Alpine meadows. June 1910." G. Forrest. No. 5978. July 1913. No. 10329.

The plant from the Lichiang Range does not quite match the Himalayan species. Where dwarf plants occur in the Himalaya with increase of altitude, there is, at the same time, a decrease in size of flower. The Lichiang plant is of stout habit with large brightly-coloured flowers.

#### *Primula tapeina*, Balf. f. et Forrest.

Species affinis *P. Dubernardiana*, Forrest a qua habitu humiliore valde florifero, foliis supra farinosis infra albo-farinosis utrinque multo minus glandulosis, calyce minore textura crassiore magis farinoso quam glanduloso, corolla alba divergit.

Planta nana suffruticosa ad 2.5 cm. ascendens densissime caespitosa glebam 30–60 cm. diametro formans, habitu *P.*

*Dubernardianae*, rhizome valido lignoso foliis marcidis dense obsito. Folia petiolata 3.5–6 cm. longa; lamina 6–8 mm. lata, anguste lanceolata vel oblanceolata in petiolum anguste alatum glanduloso-puberulum laminam subaequante angustata, supra fere plana leviter albo-farinosa vel nunc breviter glandulosopubescentia, subtus dense albo-farinosa, apice obtusa, margine subintegra vel paulo repanda. Scapus ad 2.5 cm. altus, saepe multo minor, leviter farinosus vel breviter glanduloso-pubescentia umbellam 2–6-floram gerens; bracteae 6–8 mm. longae lanceolatae vel suboblongae leviter farinosae atque pubescentes; pedicelli ad 1.5 cm. longi subglabri vel nunc pubescentes apicem versus farinosi. Calyx campanulatus circ. .6 mm. longus carnosulus albo-farinosis pilosus vel nunc breviter pubescens in lobos ovato-triangulares obtusos ad medium fissus. Corollae albae fauce luteo tubus 1 cm. paulo superans e calyce longe exsertus extra primo dense farinosus ut lobi obcordati 7 mm. longi alte emarginati. Stamina in flore longistyllo ad quartam partem tubi inferiorem inserta, in flore brevistyllo supra medium, antheris 2 mm. longis ab ore 2 mm. remotis. Ovarium globosum; stylus in flore longistyllo circ. 6 mm. longus, in brevistyllo vix 1.5 mm. aequans; stigma parvum capitatum. Fructus deest.

"S.E. Tibet:—Salween-Kiuchiang divide, Tsarong. Lat. 28° 40' N. Cushion plant of 6–12 inches diameter. Flowers white with orange eye. On dry shady rocks and cliffs. June 1919." G. Forrest. No. 18367.

"Salween-Kiuchiang divide, Tsarong. Lat. 28° 40' N. Long. 98° 15' E. Cushion plant of 1 inch. One to two feet in diameter. Flowers white occasionally tinged rose, eye yellow. Dry situations on limestone cliffs. July 1919." G. Forrest. No. 18896.

*P. tapeina* presents a very distinct appearance from *P. Dubernardiana*, Forrest in its very compact habit and freedom of flowers. It differs moreover in the character and distribution of the meal, in shorter more fleshy calyx and in the white corolla long exserted from the calyx tube.

**Primula Valentianiana**, Hand.-Mzt. in Sonderabd. aus Anz. Akad. Wien, No. 26–27 (1922), p. 5.

A beautiful dwarf species of the section Amethystinae collected by Dr. Handel-Mazzetti and published in 1922. It was also collected by Farrer and by Forrest.

"Burma:—Chawchi Pass. Alt. 12–13,000 ft. A little beauty, sheeting the flat fine lawns of the high alps in broad expanses of colour. Flowers intense pure crimson, paling to

their rim and darkening bloomily up to the intense maroon blackness of the calyx. In number they are usually two, but can be as many (in one unique case) as 5, borne in a genuine head, though sometimes they almost look superimposed. July 14th 1920." R. Farrer. No. 1723.

"S.E. Tibet :—Salwin-Kiu Chiang divide. Lat.  $28^{\circ} 12'$  N. Long.  $98^{\circ} 24'$  E. Alt. 15–15,500 ft. Plant of 2–3 inches. Flowers fleshy, deep wine-crimson, identical in shade to the darker forms of *P. secundiflora*. On open, peaty alpine meadows. July 1921." G. Forrest. No. 20000. The same in fruit. Oct. 1921. G. Forrest. No. 20850.

"Salwin-Kiu Chiang divide, west of Chamatong, Tsarong. Lat.  $28^{\circ} 18'$  N. Long.  $98^{\circ} 27'$  E. Alt. 13–14,000 ft. Plant of 1½–3 inches. Flowers solitary, occasionally in pairs, pendulous, fragrant, deep purple-crimson. Moist alpine meadows and moorland. June 1922." G. Forrest. No. 21792. The same in fruit. Oct. 1922. G. Forrest. No. 22931.

The leaves show remarkable resemblance to those of *P. Dickieana*, Watt both in shape and in the peculiar glandular markings on the under-surface.

#### *Primula violacea*, W. W. Sm. et Ward.

Species ex affinitate *P. apoclitae*, Balf. f. et Forrest atque *P. cyanantha*, Balf. f. et Forrest a quibus foliis utrinque minute scabridulo-pubescentibus inter alia divergit.

Planta 20–25 cm. alta foliis floribusque coactaneis, squamis basalibus sub anthesin destituta. Folia 5–7 cm. longa, 1–1.7 cm. lata, petiolo laminam subaequante; lamina oblanceolata vel lanceolata, apice obtusa vel subrotundata, basi in petiolum alatum sensim angustata, margine nunc fere integra, nunc obscure denticulata, nunc irregulariter dentata, per totam superficiem minute scabridulo-pubescentis in sicco tenuiter papyracea. Scapus ad 25 cm. altus gracilis epilosus sub inflorescentia albo-farinosis spicam florum sessilium pendulorum numero plerumque 6–10 parvam gerens; bracteae occultae linearis-oblongae albo-farinosa. Calyx cupularis 3–4 mm. longus ad medium in lobos inaequales alios (in spica exteriores) subrotundatos atro-purpureos extra farina sparsos intra dense farinosos alios (in spica interiores) oblongos pallidos utrinque farinosos fissus. Corollae saturate violaceae tubus cylindricus circ. 12 mm. longus supra leviter ampliatus exannulatus epilosus, lobi circ. 2.5 mm. longi subquadrati vix emarginati. Stamina in flore brevistyllo prope os inserta. Ovarium globosum; stylus in flore brevistyllo vix ad medium tubum attingens. Capsula deest.

"West China:—Litang-Yalung divide, S.W. Szechuan. Alt. 12-13,000 ft. Flowers deep violet, powdered inside with white meal, which is much more abundant than in the other Muscaroid primulas met with, so that the inside of the corolla is quite white. Bracts and upper calyx lobes light chocolate. On steep shaded slopes under Rhododendron, on the Yalung side of the divide, facing N.W. Also amongst boulders and scrub, sheltered but not shaded. Seen nowhere else but in this one spot, some 50 plants being discovered. July 1921." F. K. Ward. No. 4386.

Very much resembling *P. apocrita*, Balf. f. et Forrest, but with different leaves, closely beset on both sides with a very minute indumentum and lacking the long, white hairs so characteristic of the above species and its near allies.

**Primula werringtonensis**, Hort. Wallace. Descr. Forrest.

Microforma *P. obconicae*, Hance aestimanda; foliis basi altius cordatis textura tenuioribus minus hirsutis, floribus intensius coloratis, corollae tubo longiore et angustiore, e calyce longe exerto a typo recedit; in silvis umbrosis in montibus Likiang dictis in provincia yunnanensi atque prope Muli in eisdem locis in provincia szechuanica crescit; forma silvicola occidentalis plantae typicae esse videtur.

"West China:—Lichiang Range, Yunnan. Lat.  $27^{\circ} 30'$  N. Alt. 9-10,000 ft. Plant of 6-12 inches. Flowers rose; eye greenish-yellow, fragrant. On rocks in very shady ravines in mixed deciduous and coniferous forests. June 1913." G. Forrest. No. 10141.

"Mountains N.W. of Chien-Chuan, Yunnan. Lat.  $26^{\circ} 50'$  N. July 1914." G. Forrest. No. 12767.

Lichiang Range. In fruit. G. Forrest. Nos. 10674, 11455, 15335.

**Omphalogramma elegans**, Forrest.

Affinis *O. Souliei*, Franch. atque *O. Forrestii*, Balf. f. et fortasse prioris varietas rectius habenda; ab *O. Souliei* foliis ad anthesin vix bene evolutis supra longiuscula pilosis, calycis lobis sublinearibus acutis divergit; ab *O. minore*, Hand.-Mzt. autem valde affini fructu duplo majore recedit.

Planta sub anthesin 15-25 cm. alta, in fructu ad 60 cm. basi squamis circumdata. Folia plerumque post flores evoluta, nonnunquam fere coetanea, petiolo 3-4 cm. longo latiusculo pilis longis articulatis bene induito suffulta; lamina 4-6 cm. longa, 2-3 cm. lata, ovato-lanceolata vel ovata, apice obtusa, basi subabrupte angustata haud cordata, supra pilis longiusculis albidis bene praedita, infra sparsius ad costam nervosque,

integra vel undulata ciliolata. Scapus dense pilosus, sub flore rufo-pilosus. Calyx circ. 9 mm. longus fere ad imum in lobos plerumque sex sublineares 1-1.5 mm. latos acutos fissus plus minusve dense pubescens. Corollae saturate purpureae tubus circ. 3 cm. longus cylindricus gradatim superne ampliatus extra pilosulus intra minute pubescens exannulatus, lobi obovati circ. 2 cm. longi et 1.5 cm. lati apice bilobulati vel sub-irregulariter incisi, undique et praesertim ad margines pilis articulatis glandulosis obsiti. Stamina 6 ad medium tubum inserta fere ad os attingentia filamentis liberis circ. 6 mm. longis glabris, antheris 6 mm. longis. Stylus glaber stamina paululo superans; stigma compresso-capitatum; ovarium ovoidem glabrum 6 mm. longum. Capsula 2 cm. longa, fere 1 cm. lata, cylindrica seminibus multis disciformibus ad 3 mm. diametro pallido-brunneis; planta ad tempus fructus maturi valde elongata, ad 60 cm. alta, petiolis nunc ad 12 cm. extensis, lamina anguste oblonga saepe 13 cm. longa.

"S.E. Tibet:—Kiuchiang-Salween divide, Tsarong. Lat. 28° 12' N. Long. 98° 24' E. Alt. 14,000 ft. Plant of 8-10 inches. Flowers deep purple-blue, tube yellowish. Alpine pasture on the margins of scrub and peaty bogs. July 1921." G. Forrest. No. 19979.

"The same in fruit. Plant of 2 ft. Oct. 1921." G. Forrest. No. 20857.

"West of Chamatong. Lat. 28° 18' N. Long. 98° 27' E. Alt. 12,000 ft. Plant of 6-9 inches. Flowers rich deep indigo-purple. On moist pasture on the margins of and amongst dwarf scrub. June 1922." G. Forrest. No. 21793.

In fruit. Oct. 1922. G. Forrest. No. 22812.

#### *Omphalogramma minus*, Hand.-Mzt. in Sonderabd. aus Anzeig.

Akad. Wien, No. 26-27 (1923), p. 5.

The following appear to belong to the above recently described species collected in approximately the same area:—

"S.E. Tibet:—Salween-Kiuchiang divide, Tsarong. Lat. 28° 12' N. Long. 98° 24' E. Alt. 14-14,500 ft. Plant of 2-4 inches. Flowers throughout deep indigo-purple. Sheltered situations by streams amongst boulders. July 1921." G. Forrest. No. 20047.

"The same in fruit. Plant of 4-13 inches. Sept. 1921." G. Forrest. No. 20341.

"Salween-Kiuchiang divide west of Chamatong. Lat. 28° 18' N. Long. 98° 27' E. Alt. 11-12,000 ft. Plant of 2-4 inches. Flowers rosy-purple. Open stony pasture amongst rocks by streams. June 1922." G. Forrest. No. 21795.

The same in fruit. Oct. 1922. G. Forrest. No. 22864.